INCH-POUND

MIL-S-19500/598
11 December 1991

MILITARY SPECIFICATION

SEMICONDUCTOR DEVICE, QUAD, FIELD EFFECT TRANSISTOR,
P-CHANNEL, AND N-CHANNEL, SILICON TYPE 2N7336,
JANTX, JANTXV, AND JANS

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the detail requirements for quad N-channel and P-channel, enhancement-mode, MOSFET, power transistor intended for use in high density power switching applications. Three levels of product assurance are provided for each device type as specified in MIL-S-19500, with avalanche energy ratings (E_{AS} and E_{AR}) and maximum avalanche current (I_{AR}).

1.2 Physical dimensions. See figure 1 (MOQ3-6AB).

1.3 Maximum ratings (T_A = +25°C, unless otherwise specified).

Type	P_T T_A = +25°C (free air)	V_{GS}	I_{D1} 2/ T_C = +25°C		I_{D2} 2/ T_C = +100°C		I_S	
	W	V dc	A dc		A dc		A dc	
			N-channel	P-channel	N-channel	P-channel	N-channel	P-channel
2N7336	1.4	±20	1.0	-.75	.6	.5	1.0	-.75

E_{AS}	E_{AR}	I_{AR} 2/		I_{DM} 3/		T_{op} and T_{STG}	Max $r_{DS(on)}$ 1/ V_{GS} = 10 V dc, I_D = I_{D2}				$R_{\theta JA1}$ maximum 1 die	$R_{\theta JA2}$ maximum 4 die
							T_J = +25°C		T_J = +150°C			
mJ	mJ	A		A (pk)		°C	ohm		ohm		°C/W	°C/W
		N-channel	P-channel	N-channel	P-channel		N-channel	P-channel	N-channel	P-channel		
75	.14	1.0	-.75	4.0	-3.0	-55 to +150	0.7	1.4	1.4	2.5	90	50

See footnotes on next page.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Defense Electronics Supply Center, ATTN: DESC-ECT, 1507 Wilmington Pike, Dayton, OH 45444-5280, using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 5961

1.3 Maximum ratings (T_A = +25°C, unless otherwise specified) - Continued.

1/ Derate linearly 1.2 W/°C for T_C > +25°C. $P_T = \frac{T_J \text{ max} - T_C}{R_{\Theta JC}}$

2/ $I_D = \sqrt{\frac{T_J \text{ max} - T_C}{(R_{\Theta JA}) \times (R_{DS(on)} \text{ at } T_J \text{max})}}$

3/ I_{DM} = 4 I_{D1}; I_{D1} as calculated in footnote 2.

1.4 Primary electrical characteristics at T_C = +25°C.

Type	Min $V_{(BR)DSS}$ V_{GS} = 0 V I_D = 1 mA dc	$V_{GS(th)1}$ $V_{DS} \geq V_{GS}$ I_D = 0.25 mA	Max I_{DSS1} V_{GS} = 0 V	Max $r_{DS(on)1}$ 1/ V_{GS} = 10 V dc $I_D = I_{D2}$	
			V_{DS} = 80% of rated V_{DS}	T_J = +25°C	
	V dc	V dc	μA dc	ohms	
		Min Max		N-channel	P-channel
2N7336	100	2.0 4.0	25	0.7	1.4

1/ Pulsed (see 4.5.1).

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATION

MILITARY

MIL-S-19500 - Semiconductor Devices, General Specification for.

STANDARD

MILITARY

MIL-STD-750 - Test Methods for Semiconductor Devices.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

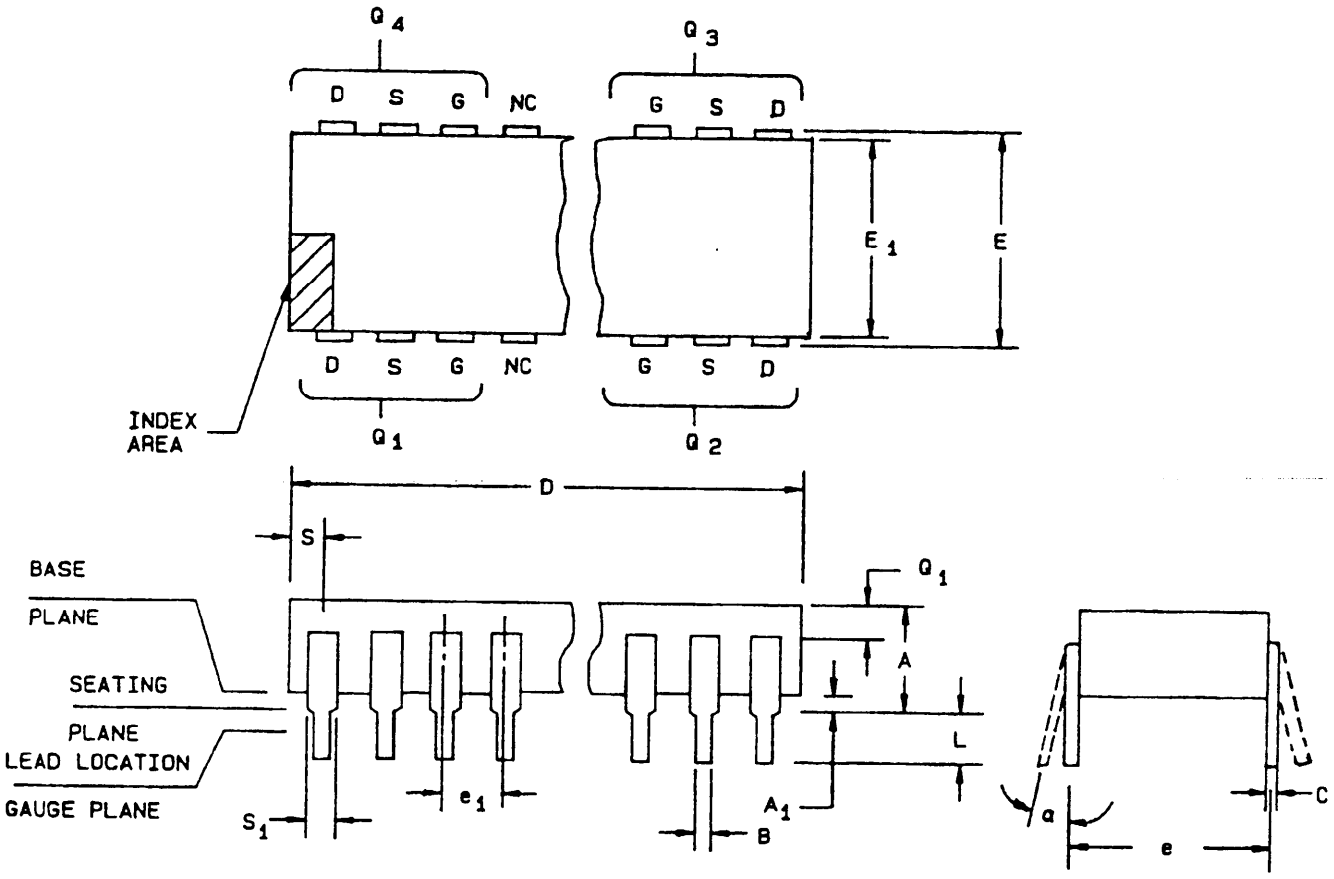

FIGURE 1. Dimensions and configuration (MO-036AB).

Symbol	AB				Note
	Millimeters		Inches		
	Min	Max	Min	Max	
A	2.67	4.44	.105	.175	11
A_1	.64	1.39	.025	.055	11
B	.381	.533	.015	.021	
B_1	.97	1.52	.038	.060	
C	.204	.304	.008	.012	
D	17.53	19.55	.690	.770	
E	7.37	8.25	.290	.325	
E_1	7.12	7.87	.280	.310	10
e_1	2.54 TP		.100 TP		5,6
e_A	7.62 TP		.300 TP		5,6
L	3.18	4.44	.125	.175	11
L_2	.00	.76	.000	.030	
α	0°	15°	0°	15°	7
N	14		14		8
Q_1	.25	---	.010	---	
S	.77	2.41	.030	.095	

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Refer to applicable symbol list.
4. Dimensioning and tolerancing in accordance with ANSI, Y14.5-1973.
5. Leads within 0.13 mm (.005 inch) radius of true position (TP) at gauge plane with maximum material condition and unit installed.
6. e_1 and e_A applies in zone L_2 when unit installed.
7. α applies to spread leads prior to installation.
8. N is the number of terminal positions.
9. Outlines on which the seating plane is coincident with the base plane (A_1 = 0), terminals lead standoffs are not required, and B_1 may equal B along any part of the lead above the seating/base plane.
10. E_1 does not include particles of package materials.
11. This dimension shall be measured with the device seated in the seating plane gauge JEDEC outline No. GS-3.
12. Controlling dimension: Inch.
13. Q_1 and Q_3 are N-channel, Q_2 and Q_4 are P-channel.

FIGURE 1. Dimensions and configuration (MO-Q36AB) - Continued.

2.2 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Detail specification. The individual item requirements shall be in accordance with MIL-S-19500, and as specified herein.

3.2 Abbreviations, symbols, and definitions. Abbreviations, symbols, and definitions used herein shall be as specified in MIL-S-19500.

3.3 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-S-19500, and figure 1 herein.

3.3.1 Lead formation material and finish. Lead finish shall be solderable in accordance with MIL-STD-750, MIL-S-19500, and herein. Where a choice of lead material or finish is desired, it shall be specified in the contract or purchase order (see 6.5).

3.4 Marking. Marking shall be in accordance with MIL-S-19500.

3.5 Electrostatic discharge protection. The devices covered by this specification require electrostatic protection.

3.5.1 Handling. MOS devices must be handled with certain precautions to avoid damage due to the accumulation of electrostatic charge. The following handling practices shall be followed.

a. Devices shall be handled on benches with conductive handling devices.

b. Ground test equipment, tools, and personnel handling devices.

c. Do not handle devices by the leads.

d. Store devices in conductive foam or carriers.

e. Avoid use of plastic, rubber, or silk in MOS areas.

f. Maintain relative humidity above 50 percent if practical.

g. Care shall be exercised, during test and troubleshooting, to apply not more than maximum rated voltage to any lead.

h. Gate must be terminated to source, $R \leq 100$ k, whenever bias voltage is to be applied drain to source.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection shall be in accordance with MIL-S-19500, and as specified herein.

4.2 Qualification inspection. Qualification inspection shall be in accordance with MIL-S-19500, and as specified herein. Alternate flow is allowed for qualification inspection in accordance with figure 2 of MIL-S-19500.

4.2.1 Group E inspection. Group E inspection shall be conducted in accordance with MIL-S-19500, and table IV herein.

4.3 Screening (JANS, JANTX, and JANTXV levels only). Screening shall be in accordance with MIL-S-19500 (table II), and as specified herein. The following measurements shall be made in accordance with table I herein. Devices that exceed the limits of table I herein shall not be acceptable.

Screen (see table II of MIL-S-19500)	Measurement	
	JANS level	JANTX and JANTXV levels
1/ 2/	Gate stress test (see 4.5.5)	Gate stress test (see 4.5.5)
1/ 2/	Method 3470 (see 4.5.4)	Method 3470 (see 4.5.4)
1/	Method 3161 (see 4.5.3)	Method 3161 (see 4.5.3)
9	I_{GSS1}, I_{DSS1}, subgroup 2 of table I herein	Subgroup 2 of table I herein
10	Method 1042, test condition B	Method 1042, test condition B
11	I_{GSS1}, I_{DSS1}, $r_{DS(on)1}$, $V_{GS(th)1}$ Subgroup 2 of table I herein; ΔI_{GSS1} = ±20 nA dc or ±100% of initial value, whichever is greater ΔI_{DSS1} = ±25 µA dc or ±100% of initial value, whichever is greater	I_{GSS1}, I_{DSS1}, $r_{DS(on)1}$, $V_{GS(th)1}$, subgroup 2 of table I herein
12	Method 1042, test condition A, t = 240 hours	Method 1042, test condition A
13	Subgroups 2 and 3 of table I herein; ΔI_{GSS1} = ±20 nA dc or ±100% of initial value, whichever is greater ΔI_{DSS1} = ±25 µA dc or ±100% of initial value, whichever is greater $\Delta r_{DS(on)1}$ = ±20% of initial value $\Delta V_{GS(th)1}$ = ±20% of initial value	Subgroup 2 of table I herein; ΔI_{GSS1} = ±20 nA dc or ±100% of initial value, whichever is greater ΔI_{DSS1} = ±25 µA dc or ±100% of initial value, whichever is greater $\Delta r_{DS(on)1}$ = ±20% of initial value $\Delta V_{GS(th)1}$ = ±20% of initial value

1/ Shall be performed anytime before screen 10.
2/ This is a stress test designed to insure a rugged product.

4.4 Quality conformance inspection. Quality conformance inspection shall be in accordance with MIL-S-19500, and as specified herein. Alternate flow is allowed for quality conformance inspection in accordance with figure 2 of MIL-S-19500.

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with MIL-S-19500, and table I herein. (End-point electrical measurements shall be in accordance with the applicable steps of table V herein.)

4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified for subgroup testing in table IVa (JANS) and table IVb (JANTX and JANTXV) of MIL-S-19500, and tables IIA and IIB herein. Electrical measurements (end points) and delta requirements shall be in accordance with the applicable steps of table V herein.

4.4.3 Group C inspection. Group C inspection shall be conducted in accordance with the conditions specified for subgroup testing in table V of MIL-S-19500, and table III herein. Electrical measurements (end points) and delta requirements shall be in accordance with the applicable steps of table V herein.

4.5 Methods of inspection. Methods of inspection shall be as specified in the appropriate tables and as follows.

4.5.1 Pulse measurements. Conditions for pulse measurement shall be as specified in section 4 of MIL-STD-750.

4.5.2 Thermal resistance. Thermal resistance measurements shall be performed in accordance with method 3161 of MIL-STD-750. $R_{\theta JA1}$ maximum = 90°C/W. $R_{\theta JA1}$ shall be performed on each die.

a. I_M measuring current - - - - - - - - 10 mA

b. I_H drain heating current - - - - - - 0.15 A

c. t_H heating time - - - - - - - - - - Steady-state (see method 3161 of MIL-STD-750, for definition)

d. V_H drain-source heating voltage - - 15 V

e. t_{MD} measurement time delay - - - - - 30 to 60 µs

f. t_{SW} sample window time - - - - - - - 10 µs maximum

4.5.3 Thermal response (ΔV_{SD} measurements). The delta V_{SD} measurements shall be performed in accordance with method 3161 of MIL-STD-750. The delta V_{SD} conditions (I_H and V_H) and maximum limit shall be derived by each vendor from the thermal response curves (see figure 3). The delta V_{SD} measurement and conditions for each device in the qualification lot shall be submitted (read and record) in the qualification report. The chosen delta V_{SD} shall be considered final after the manufacturer has had the opportunity to test five consecutive lots. The following parameter measurements shall apply:

a. I_M measuring current - - - - - - - - 10 mA

b. I_H drain heating current - - - - - - 0.15 A minimum

c. t_H heating time - - - - - - - - - - 100 ms

d. V_H drain-source heating voltage - - 15 V minimum

e. t_{MD} measurement time delay - - - - - 30 to 60 µs

f. t_{SW} sample window time - - - - - - - 10 µs maximum

TABLE I. Group A inspection.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 1						
Visual and mechanical inspection	2071					
Subgroup 2						
Breakdown voltage, drain to source	3407	V_{GS} = 0 V dc I_D = 1 mA dc Condition C.	$V_{(BR)DSS}$	100		V dc
Gate to source voltage (threshold)	3404	$V_{DS} \geq V_{GS}$ I_D = 0.25 mA dc.	$V_{GS(th)1}$	2.0	4.0	V dc
Gate current	3411	V_{GS} = +20 V dc and -20 V dc Bias condition C V_{DS} = 0.	I_{GSS1}		±100	nA dc
Drain current	3413	V_{GS} = 0 V dc V_{DS} = 80% of rated V_{DS} Bias condition C.	I_{DSS1}		25	µA dc
Static drain to source on-state resistance	3421	V_{GS} = 10 V dc Pulsed (see 4.5.1) condition A, I_D = rated I_{D2} (see 1.3).	$r_{DS(on)1}$			Ω
N-channel					0.7	
P-channel					1.4	
Forward voltage (source drain diode)	4011	Pulsed (see 4.5.1) V_{GS} = 0 V, I_D = I_{D1}.	V_{SD}			V
N-channel					1.5	
P-channel					5.5	
Subgroup 3						
High temperature operation		T_C = T_J = +125°C				
Gate current	3411	Bias condition C V_{GS} = +20 V dc and -20 V dc V_{DS} = 0 V dc.	I_{GSS2}		±200	nA dc
Drain current	3413	Bias condition C V_{GS} = 0 V dc V_{DS} = 100% of rated V_{DS}	I_{DSS2}		1.0	mA dc
		V_{DS} = 80% of rated V_{DS}.	I_{DSS3}		0.25	mA dc

See footnote at end of table.

TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Static drain to source on-state resistance	3421	V_{GS} = 10 V dc Pulsed (see 4.5.1) I_D = rated I_{D2}.	$r_{DS(on)3}$			Ω
N-channel					1.4	
P-channel					2.3	
Gate to source voltage (threshold)	3404	$V_{DS} \geq V_{GS}$ I_D = 0.25 mA dc.	$V_{GS(th)2}$	1.0		V dc
Low temperature operation		$T_C = T_J$ = -55°C.				
Gate to source voltage (threshold)	3403	$V_{DS} \geq V_{GS}$ I_D = 0.25 mA dc.	$V_{GS(th)3}$		5.0	V dc
Subgroup 4						
Switching time test	3472	I_D = rated I_{D1} V_D = .5 $V_{BR(DSS)}$ V_{GS} = 10 V dc R_g = 24Ω				ns
Turn-on delay time			$t_{d(on)}$		20	
N-channel					30	
P-channel						
Rise time			t_r			ns
N-channel					25	
P-channel					60	
Turn-off delay time			$t_{d(off)}$		40	ns
Fall time			t_f			ns
N-channel					40	
P-channel					60	
Subgroup 5						
Safe operating area test	3474	V_{DS} = 80% of rated $V_{BR(DSS)}$ t_p = 10 ms				
N-channel		I_D = 0.25 A				
P-channel		I_D = 0.05 A				
Electrical measurements		See table V herein steps 1, 2, 3, 4, 5, 6, and 7.				

TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 6						
Not applicable						
Subgroup 7						
Gate charge	3471	Condition B				
On-state gate charge			$Q_{g(on)}$		15	nC
Gate to source charge			Q_{gs}			nC
N-channel					7.5	
P-channel					7.0	
Gate to drain charge			Q_{gd}			nC
N-channel					7.5	
P-channel					8.0	
Reverse recovery time	3473	di/dt = 100 A/µs $V_{DD} \leq 30$ V dc $I_D = I_{D1}$.	t_{rr}		200	ns

1/ For sampling plan, see MIL-S-19500.

TABLE IIA. Group B inspection for JANS device.

Inspection 1/	MIL-STD-750	
	Method	Conditions
Subgroup 1		
Physical dimensions	2066	See figure 1.
Subgroup 2 2/	-	
Solderability	2026	
Resistance to solvents	1022	
Subgroup 3		
Temperature cycling	1051	Test condition G.
Hermetic seal	1071	
Fine leak Gross leak		
Electrical measurements		See table V herein, steps 1, 2, 3, 4, 5, 6, and 7.
Decap internal visual (design verification)	2075	See 3.3.2.
SEM	2077	
Bond strength (wire or clip bonded)	2037	Test condition A: All internal wires for each device shall be pulled separately.
Die shear strength	2017	
Subgroup 4		
Not applicable		

See footnotes at end of table.

TABLE IIA. Group B inspection for JANS device - Continued.

Inspection 1/	MIL-STD-750	
	Method	Conditions
Subgroup 5 2/		
Accelerated steady state reverse bias	1042	Condition A, V_{DS} = rated T_A = +175°C, t = 120 hours Read and record $V_{BR(DSS)}$ (pre and post) at I_D = 1 mA. Read and record I_{DSS} (pre and post), in accordance with table V.
Electrical measurements		See table V herein, steps 1, 2, 3, 4, 5, and 6. No more than 15% of the sample shall be permitted to have a $\Delta V_{BR(DSS)}$ shift of more than 10% and ΔI_{DSS} greater than 50 μA.
Accelerated steady state gate stress	1042	Condition B, V_{GS} = rated T_A = +175°C, t = 24 hours.
Electrical measurements		See table V herein, steps 1, 2, 3, 4, 5, and 6.
Bond strength (Al-Au die interconnects only)	2037	Test condition A.
Subgroup 6		
Thermal impedance	3161	See 4.5.2.

1/ For sampling plan, see MIL-S-19500.
2/ A separate sample may be pulled for each test.

ions, symbols, and definitions used herein shall

TABLE IIB. Group B inspection for JANTX and JANTXV.

Inspection 1/	MIL-STD-750	
	Method	Conditions
Subgroup 1 2/		
Solderability	2026	
Resistance to solvents	1022	
Subgroup 2		
Temperature cycling	1051	Condition G.
Hermetic seal	1071	
Fine leak Gross leak		
Electrical measurements		See table V herein, steps 1, 2, 3, 4, 5, 6, and 7.
Subgroup 3 2/		
Steady state reverse bias	1042	Condition A, V_{DS} = 80% of rated T_A = +150°C, t = 160 hours.
Electrical measurements		See table V herein, steps 1, 2, 3, 4, 5, and 6.
Steady state gate stress	1042	Condition B, V_{GS} = 80% of rated T_A = +150°C, t = 24 hours.
Electrical measurements		See table V herein, steps 1, 2, 3, 4, 5, and 6.
Bond strength (wire or clip bonded)	2037	Test condition A.
Subgroup 4		
Decap internal visual (design verification)	2075	
Subgroups 5 and 6		
Not applicable		

1/ For sampling plan, see MIL-S-19500.
2/ A separate sample may be pulled for each test.

TABLE III. Group C inspection (all quality levels).

Inspection 1/	MIL-STD-750	
	Method	Conditions
Subgroup 1		
Physical dimensions	2066	See figure 1.
Subgroup 2		
Thermal shock (glass strain)	1056	Condition A.
Terminal strength (tension)	2036	Test condition A: Weight = 10 pounds t = 15 seconds.
Hermetic seal	1071	
Fine leak Gross leak		
Moisture resistance	1021	
Electrical measurements		See table V herein, steps 1, 2, 3, 4, 5, 6, and 7.
Subgroup 3		
Shock	2016	
Vibration, variable frequency	2056	
Constant acceleration	2006	
Electrical measurements		See table V herein, steps 1, 2, 3, 4, 5, and 6.
Subgroup 4		
Salt atmosphere	1041	
Subgroup 5		
Not applicable		

See footnote at end of table.

TABLE III. Group C inspection (all quality levels).

Inspection 1/	MIL-STD-750	
	Method	Conditions
Subgroup 6		
Steady state reverse bias	1042	Condition A, V_{DS} = 80% of rated T_A = +150°C, t = 340 hours.
Electrical measurements		See table V herein, steps 1, 2, 3, 4, 5, and 6.
Steady state gate stress	1042	Condition B, V_{GS} = 80% of rated T_A = +150°C, t = 24 hours.
Electrical measurements		See table V herein, steps 1, 2, 3, 4, 5, and 6.
Bond strength	2037	Test condition A.

1/ For sampling plan, see MIL-S-19500.
2/ A separate sample may be pulled for each test.

TABLE IV. Group E inspection (all quality levels) for qualification only.

Inspection	MIL-STD-750		Qualification and large lot quality conformance inspection
	Method	Conditions	
Subgroup 1			45 devices c = 1
Temperature cycle	1051	Test condition G, 500 cycles.	
Hermetic seal			
a. Fine leak b. Gross leak			
Electrical measurements		See table V herein, steps 1, 2, 3, 4, 5, 6, and 7.	
Subgroup 2 1/			45 devices c = 1
Steady-state reverse bias	1042	Condition A, 1,000 hours.	
Electrical measurements		See table V herein, steps 1, 2, 3, 4, 5, and 6.	
Steady-state gate bias	1042	Condition B: 1,000 hours.	
Electrical measurements		See table V herein, steps 1, 2, 3, 4, 5, and 6.	
Subgroup 3			3 devices c = 0
Destructive physical analysis (DPA)	2102		
Subgroup 4			5 devices c = 0
Thermal resistance	3161	$R_{\theta JA1}$ = 90°C/W maximum. See 4.5.2.	
Subgroup 5			
Not applicable			

1/ A separate sample for each test may be pulled.

TABLE V. Group A, B, C, and E electrical end-point measurements.

Step	Inspection	MIL-STD-750		Symbol	Limits		Unit
		Method	Conditions		Min	Max	
1.	Breakdown voltage drain to source	3407	V_{GS} = 0 V I_D = 1.0 mA dc Bias condition C.	$V_{(BR)DSS}$	100		V dc
2.	Gate to source voltage (threshold)	3404	$V_{DS} \geq V_{GS}$ I_D = 0.25 mA dc.	$V_{GS(th)1}$	2.0	4.0	V dc
3.	Gate current	3411	V_{GS} = ±20 V dc bias condition C.	I_{GSS1}		±100	nA dc
4.	Drain current	3413	V_{GS} = 0, V_{DS} = 80% of rated V_{DS} bias condition C.	I_{DSS1}		25	µA dc
5.	Static drain to source on-state resistance	3421	V_{GS} = 10 V dc Condition A Pulsed (see 4.5.1) $I_D = I_{D2}$	$r_{DS(on)1}$			Ω
	N-channel					0.7	
	P-channel					1.4	
6.	Forward voltage (source-drain diode)	4011	Pulsed (see 4.5.1) V_G = 0 V $I_D = I_{D1}$.	V_{SD}			V
	N-channel					1.5	
	P-channel					5.5	
7.	Thermal response	3161	See 4.5.3	ΔV_{SD}			

4.5.4 Single pulse avalanche energy E_{AS}.

a. Peak current, I_{AS} - - - - - - - - - - I_{D1}

b. Peak gate voltage, V_{GS} - - - - - - 10 V

c. Gate to source resistor, R_{GS} - - - $25 \leq R_{GS} \leq 200\Omega$

d. Initial case temperature - - - - - - +25°C +10, -5°C

e. Inductance - - - - - - - - - - - - - - $\left[2E_{AS}/(I_{D1})^2\right]\left[\frac{(V_{BR} - V_{DD})}{V_{BR}}\right]$ mH minimum

f. Number of pulses to be applied - - - 1 pulse minimum

g. Supply voltage (V_{DD}) - - - - - - - - 25 V minimum

4.5.5 Gate stress test.

a. V_{GS} = 30 V minimum.

b. t = 250 μs minimum.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-S-19500.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory).

6.1 Notes. The notes specified in MIL-S-19500 are applicable to this specification.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of the specification.

b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1).

c. Lead formation material and finish may be specified (see 3.3.1).

6.3 Substitution information. Devices covered by this specification are substitutable for the manufacturers' and users' part number. This information in no way implies that manufacturers' part numbers are suitable as a substitute for the military Part or Identifying Number (PIN).

Military PIN	Manufacturers' CAGE code	Manufacturers' and users' PIN
2N7336	59993	IRFG91

CONCLUDING MATERIAL

Custodians:
Army - ER
Navy - EC
Air Force - 17
NASA - NA

Review activities:
Navy - AR, MI
Air Force - 19, 85, 99
DLA - ES

User activity:
Army - SM
Navy - AS, CG, MC, OS
Air Force - 13

Preparing activity:
Navy - EC

Agent:
DLA - ES

(Project 5961-1302)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER	2. DOCUMENT DATE (YYMMDD)
	MIL-S-19500/598	1991 December 11

3. DOCUMENT TITLE: Semiconductor Device, Quad, Field Effect Transistor, P-channel, and N-channel, Silicon type 2N7336, JANTX, JANTXV, AND JANS

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle Initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (If applicable)	7. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

a. NAME	b. TELEPHONE (Include Area Code) (1) Commercial	(2) AUTOVON
Alan Barone	(513)296-6048	(AV)986-6048
c. ADDRESS (Include Zip Code) DESC-ECT Dayton, Ohio 45444-5280	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	